WOMEN EMPOWERMENT IN FISHERIES

Editors

A S Ninawe

Department of Biotechnology
Block-II, CGO Complex, Lodhi Road
New Delhi-110003

A D Diwan

Indian Council of Agricultural Research (ICAR)
Krishi Anusandhan Bhawan-II, Pusa
New Delhi-110012

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ADOPTION OF FISHERY ENTERPRISES AND EMPOWERMENT OPTIONS FOR FISHERWOMEN OF INDIA

R SATHIADHAS, F HASSAN and A D DIWAN

INTRODUCTION

Women play a crucial role in the growth and development of any agrarian economy. The economic status of women is widely accepted as an indicator for assessing the exact stage of development of society. As compared to men, women in small and marginal farms undertake heavy load of work both in the farms and in the house, with very limited access to and control over the resources necessary for farming and house keeping. Though women are not actively involved in marine fisheries, they contribute substantially in the pre and post harvest operations. Although the involvement of women is limited in capture fisheries, their supportive role in active fishing has increased manifold with the advent of mechanisation and enhancement of multi-day fishing in marine fisheries. The upcoming of women into the labour driven segments of fishery sector has increased over the years. This is attributed to the overall development of aquaculture, intensification of marine fishing and increase in the exports of marine products. The occupational pattern of women has further undergone a structural change with the shift from net mending to fish marketing and processing. The irregularities in the earning pattern of their men counterparts, coupled with the need for livelihood sustainability, forces most of the women to earn from a variety of fishery related activities.

The role of women is substantial in sustaining the livelihood agenda and form an integral part of any development initiative. In India, the contribution of women in fisheries both in aquaculture production and post harvest sector is substantial. India is endowed with a coastline of 8,129 kms with 3,638 fishing villages. About 5 lakh women are involved in the post harvest sector of marine fisheries. The fisheries sector has provided an export earning of about Rs.6800 crores during 2002-03 to the country's exchequer. Though the statistics regarding the geographic distribution of fresh and brackish water areas suitable for aquaculture is available, there is a dearth of quantitative data regarding the employment, production and earnings of women in different segments. The brackish water area alone suitable for aquaculture is 1.12 million ha in which hardly 10 percent is currently utilized.

Besides, the fresh water resources of rivers and canals of 1.71 lakh km, reservoirs of 2.05 million ha, ponds and tanks of 2.86 million ha and beels, oxbow lakes and swamps of 0.79 million ha, also offer immense scope for fisheries development and enormous employment opportunities to women. Women have intensified their participation in various fishery related activities and aquaculture practices ranging from breeding of fish to processing and marketing including value addition. The seasonal nature of employment in the fisheries sector displays a distorted picture about the per capita earnings of fisher folk and this is quite correlative with their poverty status.

In this context of growing role of women in all spheres of fisheries development, the present paper deals with the specific objectives of assessing, 1. the role of women in capture fisheries both in marine and inland sectors. 2. the extent of current involvement of women in various aquaculture practices and *vis-à-vis* it's potential. 3. the nature and pattern of women involvement in post-harvest enterprises, their wage structure, problems and working conditions. 4. the empowerment models of women with specific reference to self help groups for mobilisation of funds and 5. to give policy suggestions for empowerment of women and enhancing their role in adopting fisheries as a remunerative enterprise.

WOMEN IN CAPTURE FISHERIES

Capture fisheries is the domain of men as it requires tedious and long working hours mostly away from the shore. Hence, full time involvement of women in the primary sector of captures fisheries is negligible, rather it is more of a seasonal nature in certain activities in marine, brackish and fresh water segments. In marine fisheries women are involved only in seaweed collection, collection of bivalves and seeds with seasonal and regional peculiarities. Fisherwomen along the Ramanathapuram Coast of Tamil Nadu are involved in the collection of agar yielding Red Sea weeds (Surtida, 1998). It is reported that about 70 % of the workers employed in seaweed collection and processing in India are women (Kaladharan and Kaliaperumal, 1999). Women are also actively involved in the collection of bivalves and their marketing to ornament dealers and lime collectors (Shaleesha, 1997). In capture fisheries, brackish water sector also, the involvement of women is observed to be passive except their engagement in the collection of clam and seed collection of fish and shrimps. It is more or less remains as an involvement for basic subsistence. Fresh water fisheries provide larger opportunities to women as they engage mainly in fishing using scoop nets, traps and fish vessels in addition to the hand picking methods, almost throughout the year.

In India, the nature and extent of women's role in fisheries varies from state to state and details are given in Table 1.

With regard to capture fisheries, the involvement of woman is more in fresh water sector like riverine and reservoir fisheries. The increase in the intensity of automation and technological upgradations, the women involvement in certain segments of capture fisheries is increasing in few regions both in inland and marine sectors. It is quite possible that the inshore marine fishing operations can be easily undertaken by women in addition to the

near shore shell, seed and seaweed collection currently carried out by them . It is further evident that the participation of women in fisheries and allied activities is comparatively more in coastal areas and in north-eastern region of the country.

Table 1. Brief details of State-wise role of women in fisheries

States	Role of women in fisheries
Jammu& Kashmir, Punjab, Haryana, Himachal Pradesh and Uttar Pradesh	Participation of women in fisheries is nil or negligible
Bihar,West Bengal, Madhya Pradesh and Orissa	Participation of women is very negligible and limited to retail marketing, and net mending
North eastern states of Assam, Manipur, Tripura and Meghalaya	Active participation in fisheries, Women do part time fishing using passive gear like traps, Chinese dip nets, dewatering of shallow areas and retrieving of fishes
Gujarat, Maharashtra, Goa, Karnataka, Kerala,Tamil Nadu and Andhra Pradesh	Limited role in capture fisheries like seed collection, clam collection handpicking of fish. Active participation in allied activities such as fish drying, fish loading and unloading, net mending, retail marketing and fish processing

Source: Kohli *et. al.* (1999)

ROLE OF WOMEN IN AQUACULTURE

Culture fisheries is a widely growing area providing huge labour-days to the fisherfolk. In the two major types of aquaculture systems such as pump-fed and tide-fed, women have enough places to perform their roles. Women are increasingly independent and devoid men's involvement in the collection of wild seeds, segregation and stocking, construction and maintenance of ponds, feeding and harvesting in Kerala (Purushan, 1995). In view of the expansion of diversified aquaculture practices utilising more of the potential water bodies, women can be largely absorbed into the sector. In the East Godavari District of Andhra Pradesh, women get employment in shrimp farms for 4 to 5 months in a year for activities like pond construction, seed collection and segregation, de-weeding of pond and hand picking of shrimp during harvest. Similarly women constitute about 40 per cent of the labour force involved in shrimp farm activities in Tamil Nadu (Gopalakrishnan, 1996). Some of the small-scale coastal aquaculture technologies tested and proved as economically viable and could be adopted in a commercial scale are backyard hatchery technology for seed production of white shrimp *Penaeus indicus,* Scientific shrimp culture practices, Mud crab culture and fattening technology, Seed production technology of pearl spot, different finfish culture practices, culture of seabass *Lates calcarifer,* Mussel culture technology, Pearl culture technology, Edible oyster culture technology, Ornamental fish culture practices and Carp culture practices.

Both the fresh water as well as brackish water segments offer immense scope for aquaculture development and employment opportunities to women. The technological revolution that took place in the shape of hatchery fish seed production and semi intensive 'composite fish culture' catapulted India to the second highest aquaculture producer country in the world after China. The changes in technology has held in increasing unit area productivity from a level of less than a tonne per hectare to about 2 tonnes per hectare over a period of 10 years. The area under aquaculture has also gone up significantly. The revolution in the field of aquaculture was possible by introduction of new technology, through centrally sponsored schemes of fresh water Fish Farmers Development Agency (FFDA) and implementation of IDA sponsored externally aided Inland fisheries Scheme. India is a "carp" country and still enormous potential is there to enhance carp production in fresh water aquaculture sector. Though Inland capture fishery resource in terms of rivers and canals, reservoirs, estuaries and lagoons are noted for their variety and richness, their production potential through aquaculture is yet to be fully realised. The reservoirs hold maximum promise, as at the present level of management, their yield is on an average 30kg/ha, whereas production of 50-100 kg/ha can easily be realised.

Although the contribution of brackish water capture fisheries is not significant, there has been a steady rise in production from shrimp culture till 1994-95. Thereafter the production dropped till 1997-98 and picked up again in 1998-99. Now the rising trend is continuing. This may be due to the adoption of improved culture practices besides horizontal expansion. It clearly indicates the potential for enhancing shrimp production and productivity in India. The State of Andhra Pradesh contributed substantially in overall increase in shrimp production, primarily due to increase in area (50-71 thousand ha) despite the disease problem and reduction in stocking rates. The shrimp yield in India over past decade has not observed a regular trend. It reached a maximum of 819 kg ha in 1994-95 and declined to 472 kg/ ha in 1997-98. Finally, during 2001-02, it was 660 kg/ ha. Among the states, the maximum yield was for Tamil- Nadu for most of the years (1.48-3.49 t/ ha) except 1995-96, due to disease outbreak. The shrimp oriented aquaculture is adopted and spread hardly 10-20% of the suitable potential area indicating the scope for the development of diversified aquaculture practices for optimum utilization of the identified potential areas.

The open sea mariculture practices and aquaculture practices in fresh and brackish water segments provide comparatively better employment opportunities to women. Hence massive investment should be made through self help groups of women or cooperatives for location specific development of aquaculture estates in various regions for full utilization of our potential sites to enhance production and employment opportunities to women.

WOMEN IN POST-HARVEST SECTOR OF FISHERIES

In fisheries, the post-harvest sector provide maximum employment to women. Every 5 kg of fish produced provided employment for 2 persons – one in active fishing and one in Post-harvest sector. About 5 lakh women are employed in pre and post-harvest operations in the marine fisheries sector alone in the total work force of 12 lakh persons. However the

working conditions are poor and the wage-rates received by the women are comparatively low. The involvement of women in various post harvest activities with a broad indicative picture of nature, employment pattern and wage structure is given in Table-2.

Table 2. Nature and pattern of involvement of women in post -harvest fisheries

Sl. No	Occupation	Place/Type/Nature	Employment and Wages
1.	Sorting and Grading	1. All major mechanised centres 2. Throughout the year but intense work during peak seasons 3. Flexible working hours	1. Mostly contract employment. 2. Monthly earnings ranges from Rs. 300/- to Rs. 3500/-
2.	Curing and Drying	1. All fish landing centres 2. Highly seasonal 3. Market surplus is mostly used for curing and drying	1. Self employed/ Contract 2. Monthly income varies from nil to Rs. 1500/-
3.	Peeling work	1. Major trawl/export centres 2. Throughout the year 3. Working hours flexible as per seasonality	1. Mostly contract labours/daily workers 2. Monthly earnings varies from Rs. 300/- to Rs. 2000/-
4.	Processing work	1. Export companies 2. Freezing/grading and packing/ Quality assurance 3. Fixed work hours throughout the season	1. Regular employment 2. Monthly salary ranges from Rs. 1500/- to Rs. 3,000/-
5.	Fish meal work	1. All major centres 2. Throughout the year but intense during peak seasons 3. Utilization of fish waste and surplus	1. Self employment/ contract labourers 2. Monthly wages range from Rs. 500/- to Rs.3000/-
6.	Fish trading	1. All landing centres/marketing centres 2. Throughout the year 3. Perform all roles from that of auctioneers to retail vendors. 4. Long working hours	1. Self employment 2. Average monthly income ranges from Rs. 500/- to Rs. 3000/-
7.	Value addition	1. All major centres 2. Fish varieties used will depend on availability 3. Catering both domestic and international demand	1. Mostly as competitive venture 2. Good opportunity for self help groups 3. Monthly earnings ranges from Rs. 750/- to Rs. 2000/-

Source: Sathiadhas *et. al.*, 2003a

In Tamil Nadu women engage themselves in fish curing, marketing, netmaking and prawn seed collection. In Andhra Pradesh, the occupation of women include collecting

fish, and molluscan shells whereas their major contribution is in drying, curing, marketing, shrimp processing and netmaking. In West Bengal, fishermen engage themselves in netmaking also which in other States is dominated by women. Women from communities other than fisherfolk carried out fish drying and curing in West Bengal. In Maharashtra, the entire fishery economy is revolving around women. In Gujarat mostly women do the handling and processing activities. In Lakshadeep, particularly Minicoy, the major fishery products known as *masmin, riha*, and *akru* of tuna are produced by women (Femeena Hassan, 1998). In salt production from sea water in Tamilnadu, the ratio of women to men labour contribution is 4:1. However the overall structural changes in the marine fisheries sector brought about by mechanization and export oriented development efforts have dislodged a good proportion of women in small fish landing centres and employment sectors like net making.

The occupational status of fisherwomen involved in marine fisheries sector in all 34 coastal districts of Andhra Predesh, Karnataka, Kerala and Tamil Nadu studied under a National Agriculture Technology Project is given in Table 3. Altogether 2,53,042 fisherwomen are involved in this region in one or other post-harvest activity.

Table 3. Occupational Status of Fisherwomen in A.P, T.N., Kerala and Karnataka*

Occupation	No. of fisherwomen Total				
	Andhra Pradesh	Tamil Nadu	Kerala	Karnataka	Total
Beach workers	8742 (9)	2589 (8)	5612 (6)	15000 (44)	31943 (12)
Small scale fish traders	23033 (24)	16790 (51)	20220 (23)	12000 (34)	72043 (28)
Fish curers and dryers/ net	31775 (32)	10823 (32)	6504 (7)	3000 (9)	52102 (21)
makers Peeling workers	6442 (6)	478 (1)	39397 (45)	2000 (6)	48317 (19)
Processing plant workers	25977 (27)	1172 (4)	14028 (16)	900 (3)	42077 (17)
Others	1800 (2)	1260 (4)	2000 (3)	1500 (4)	6560 (3)
Total	97769 (100)	33112 (100)	87761 (100)	34400 (100)	253042 (100)

Source: Sathiadhas *et al.*, 2003c **Figures in parenthesis are percentages*

The common occupation in which women engaged are beach work, small-scale fish trading, fish curing / drying / net making, peeling and processing plant work. Altogether

about 2.5 lakh women are involved in different activities. Out of this, a total number of 72,043 (28 per cent) women are engaged in small-scale fish trading. Fish curers/dryers/net makers constitute 21 per cent of the total women work force. The second largest category of occupation is that of peeling work (19 per cent) followed by processing plant work (17 per cent). Peeling work as well as processing plant work are mostly institution- based and more likely to be in the formal sector of employment. Hence entry into such jobs is comparatively more restrictive than other engagements. It could be presumed that the increase in production figures of fisheries sector would have its immediate accelerator effect upon the informal employment sector (non-institution based), such as beach work, fish trading, fish curing/drying/net making. As far as Kerala is concerned, peeling work dominates the occupational scene with 45 per cent of the total women work force. Tamil Nadu has a significantly different occupational pattern, in which 51 per cent of the women work force engage in fish trading, and 32 per cent in fish curing/drying/net making. The State is yet to make its fisheries ventures more formal and the potential of institution-based fish processing for women is comparatively high in Tamil Nadu. Karnataka also displays a similar picture, as 44 per cent and 34 per cent of its fisherwomen are engaged in beach work and small-scale fish trading respectively. Andhra Pradesh employs 32 per cent of its fisherwomen in fish curing/drying/net making and 27 per cent in processing plant works.

INCOME LEVELS OF WOMEN INVOLVED IN DIFFERENT PROCESSING ACTIVITIES

The fishing community is mostly dependent on the fishery resources for livelihood and the roles that fisherwomen play in this respect are of great importance for the maintenance of the family (Srinath, K, 1987). Table-4 shows the income level of women in different processing activities and the average number of hours spent by them in different post harvest activities. Although value addition provides the highest earnings per hour, fish vending offers the best opportunity to earn higher annual income, in terms of the average annual working hours provided. Prawn peeling is a seasonal activity depending on season, the peak period being June-September. Prawn peeling is mostly carried out either in peeling sheds, houses rented/owned by agents or in homesteads of workers. Usually, in a peeling shed, women are employed depending on the quantity of prawns they peel in a day. On an average, a woman gets Rs.50 to 60 per day during the peak season. The average annual income of a prawn peeler is Rs.9720, which varies from Rs.500 for occasional part time worker to Rs.20000 for a full-time worker.

As soon as the catch is landed, mostly women are engaged for post harvest operations including curing and drying. The average number of hours spent by a woman labourer in a year in curing work is 1944 and for sorting, the hours spent in a year is 1960. Sorting is done for separating different varieties of fishes into separate lots. There are three grades of sorting based on the uniformity in size and quality identified in first, second and third grades. The procured fishes are sorted out and trash fishes are taken to fishmeal plants. The exportable varieties are graded, cleaned, packed in ice and sent to processing centres. It is

found that the average income obtained per hour from sorting is Rs. 4.20. It is also observed that the women sorters sell some edible prawns and small fishes discarded from the lot. This earning either becomes an additional source of income or if not sold, the fish is used for household consumption. On an average, 729 hours a year is spent for drying activities. In fish drying, women labourers working on contract basis earn Rs.100 for each lot. They require about 3 days of time for drying each lot. The time spent on fish drying ranged from 8 to 12 hours a day.

Women fish vendors operate as an important link between producers and final consumers. They purchase fish either from the fishermen at landing centres through auction or from traders through bargaining. Fish vendors mostly undertake the distribution of fishes at the retail market. Female vendors carry baskets of fish as head loads where as male vendors use cycles to carry fish for marketing. These fisherwomen borrow Rs.500 to Rs.2000 daily from middlemen to buy fish. After selling fish they return the money to the lenders with interest. They buy ice worth Rs.40 to 50. No wastage of fish is recorded as the fisherwomen take the fish remaining either for household consumption or for drying. The average income per day for their labour comes about Rs.200 to 300 per day and this works out to an average annual income of Rs.59,760 (Table-4).

Table 4. Average working hours and earnings of women in different fishery related activities

Sl. No	Activity	Average Annual working hours	Average Income per hour (Rs)	Average Annual income (Rs)
1	Peeling	1620	6.00	9720
2	Curing	1944	12.00	23328
3	Drying	729	4.40	32076
4	Sorting	1960	4.20	8232
5	Vending	3600	16.60	59760
6	Value Addition	900	20.00	18000

Source: Sathiadhas *et al.*, (2003a)

Age-wise distribution of women engaged in different post harvest activities studied in Kerala is given in Table-5. Majority of the women involved in activities like peeling, curing and value addition work belong to 20-40 years age group and those in activities like sorting, drying, marketing (fish vendors), majority are between 40-60 age group. In the case of drying and sorting, 5 per cent of fisher women are above 60 years in age. Activities like drying and sorting entail comparatively less physical stress and this might be the reason for the involvement of more old women in it. Maximum number (80 per cent) of women are engaged in value addition works, this being skill oriented and only youngsters and middle aged women opt for this work. Young and unmarried girls are usually not allowed to go for vending purpose, and the few in this activity take up the job due to poverty and unemployment. Accordingly, 70 per cent of fish vendors belonged to 40-60 years age group and only 30 per cent belonged to 20-40 years age group.

Table 5. Age wise distribution of women in different activities (%)

Age Group	Peeling	Curing	Drying	Sorting	Value Addition	Fish Vendors
<20	8	–	–	–	5	–
20-40	57	75	40	25	80	30
40-60	30	25	55	70	10	70
>60	5	–	5	5	5	–

SOCIO-ECONOMIC STATUS OF WOMEN IN SMALL SCALE FISHERIES

Poverty has a gender bias. In most of the regions of the world, women are poorer than men; this is because women face a whole series of complex cultural, social, traditional, economic and legal constraints that even poor men do not face. They have far less opportunities than men to get education and training and therefore possess very few skills necessary for today's world. There appears to be a definite feminization of poverty. When a community as a whole is poor and downtrodden, the womenfolk in the community have to bear the brunt of it all the more (Dehadrai, 2002)

Fisherwomen in any work sector can be found occupying the position of a sub category or performing supportive roles. At landing centres, women engaged in fish drying collects small sized bycatches. In markets, women usually sell low value products in a remote corner. Wholesalers among women are very few. Women in value addition sector indicated low price for products and lack of assured markets as main constraints. They sell their products to local petty shops and house holds. The fisherwomen are often denied credit from public sector institutions due to lack of ownership of assets. (Ashaletha *et al.*; 2002)

Six parameters namely Food Security and Nutrition, Income, community services, Division of labour, Fish processing and Marketing were used to assess the position of general situation of women in small scale fisheries. The data obtained is provided in Table 6. A comparison among States indicate that Karnataka occupies first rank in food security

Table 6. Position of general situation of women in small scale fisheries

Sl. No.	Parameters	States studied			
	A.P.	Karnataka	Kerala	Tamil Nadu	
1	Food security and nutrition	60% (4)	72% (1)	70% (2)	65% (3)
2	Income	60% (1)	40% (4)	50% (2)	46% (3)
3	Community services	66% (3)	97% (1)	64% (4)	96% (2)
4	Division of labour	50% (2)	40% (4)	52% (1)	45% (3)
5	Fish processing	40% (4)	80% (1)	70% (2)	50% (3)
6	Marketing	50% (4)	70% (2)	80% (1)	60% (3)

Source: Sudhakara *et al.*, 2003 *Values in the parenthesis denote ranks*

and nutrition, community services and fish processing. Kerala occupies first rank in division of labour and marketing. Andhra Pradesh occupies first rank in income where as Tamil Nadu occupies third rank in almost all the parameters. But when seen the mean of the relative ranks, Kerala ranks first followed by Karnataka, Tamil Nadu and Andhra Pradesh. This clearly indicate that Kerala occupies first place in the position of general situation of women in small scale fisheries.

The general constraints confronted by fisher women involved in post-harvest activities are given in Table 7.

Table 7. Constraints encountered by fisherwomen in post harvest fisheries

	Processes	Problems
1.	Sun drying	a) Lack of open and clean space. Drying in open beaches and contamination from microbes b) Improper storage facilities c) Infestation from maggots and insects d) Seasonality of fish availability e) Lack of alternatives during monsoon f) months Low quality raw materials g) Less credit facilities
2.	Clam fishing-cum-processing	a) Long working hours b) Lack of depuration facilities c) Manual shucking of shells d) Low demand and price in internal markets e) Poor awareness of scientific processing f) Low income and poor credit facilities
3.	Fish trading	a) Long working hours b) Competition from men c) Inadequate transportation and lack of automation d) Exploitation by middle man e) Seasonality of products Lack of storage in marketing centres f) High indebtedness and poor credit facilities
4.	Peeling and other Processing activities	a) Disguised unemployment b) Contract system and lack of job security c) Low wage rate d) Lack of supplementary and complementary occupation e) Occupational hazards and health problems f) Seasonality of product availability g) Lack of regular working hours

The perishable nature of fish requires quick movement of it from the catching point to the final disposal to consumers. In the process of transportation and distribution of fish, there is substantial loss in which women traders are affected and incur loss. The general reasons attributed at different stages for post-harvest losses are given in Table 8.

Table 8. General reasons for post harvest losses encountered by fisherwomen.

	Stages	Reasons for losses
1.	Fresh fish handling	a) Inadequately cleaned containers b) Bacterial loads associated with utensils, water and ice in some primary handling centres c) Bacterial loads on fish from inadequately cleaned boat decks d) Inadequate icing and storage facilities Spoilage
2.	Salting	a) Improper proportion of salt use b) Contamination of sand c) Contamination of microbes associated with open beach premises d) Wastages in dressing
3.	Drying	a) Lack of space in drying b) Lack of alternatives other than sun drying c) Poaching
4.	Storage	a) Animals and insects b) Electricity failure c) Packaging problems

The post-harvest losses can be avoided to a greater extent by providing appropriate training to women in hygienic handling and processing of fish and fishery products. Some of the other coping strategies which can be adopted to minimize post- harvest losses and increasing the earning capability of fisher women are, 1. Establishing community curing/ processing/drying yards, 2. Introduction of platform/rack drying methods, 3. Adoption of scientific clam processing, 4. Promotion of value addition in fish marketing system, 5. Introduction of special transportation facilities for fisher women, 6. Introduction of special loan facilities and 7. Appropriate adoption of waste disposal system in peeling sheds and processing plants

POTENTIAL FISHERY ENTERPRISES FOR WOMEN

Economic empowerment of fisherwomen is possible by providing employment opportunities and creating some income generating activities. Among fisherwomen mobility is limited. Hence they need some eco-friendly technologies, which could provide additional income to the family. There are enough evidences to show that if enough opportunities are provided, women can contribute substantially for the national economy. The basic goal in the development of fisherwomen is to make them self-reliant participants for improving their conditions. Development work should support women in their domestic, economic and social roles and provide them opportunities to acquire technologies, enabling them to contribute to the economic well-being. Methodological frameworks for the empowerment help them to take a leading and active role for the betterment of the society.

Some of the small scale aquaculture and fishery enterprises tested and proved as viable ventures for improving the standard of living of fisherwomen are given below.

Capture Fisheries

The role of women in agriculture is increasing over the years with the introduction of high yielding varieties and other technological changes. In fisheries also motorisation of country crafts and other technological changes has eased the stress involved in capture fisheries and involvement of women in near shore marine fishing and riverine and reservoir fisheries can be enhanced through appropriate train

Backyard Hatchery Technology for Seed Production of Shrimp *and* Finfish

Availability of quality seeds at cheaper rates is the most important pre –requisite for widespread adoption of any aquaculture practice. The demand for quality hatchery seed of the white shrimp *Penaeus indicus* is increasing. A simple technology is available for seed production of white shrimp *Penaeus indicus* and the economics of producing PL 20 seeds have been worked out by Lakshminarayana (1995). Women entrepreneurs can easily take up this cost effective small scale venture in the backyard of their homes in the coastal areas having access to seawater facility. Similarly the Asian seabass *Lates calcarifer* is a highly priced fish with great domestic and export demand. In India seabass is polycultured in traditional tide-fed ponds along with other fish and shrimp. The seabass culture is a profitable venture and the technology is very simple which can be easily adopted by fisherwomen.

Mud Crab (*Scylla* spp.) Fattening Technology

With the increasing demand for mud crabs in the export market, crab culture/fattening technology has emerged as one of the most lucrative aquaculture enterprises. Unlike shrimp farming which needs higher capital investment, the mudcrab culture and fattening can be carried out with less finance. Mud crabs (*Scylla tranquebarica* and *Scylla serrata)* are in great demand for their delicious meat, nutritional and medicinal values. The culture practice includes pond preparation, proper water exchange for ensuring water quality, proper feeding and feeding schedule. In India, mud crabs are utilised for local consumption and export trade in live or frozen forms. To meet the demand, small crabs collected from wild are cultured or fattened. Mud crab fattening is a highly profitable venture involving a fattening period of about one month and can be easily adopted by fisher women in small earthen ponds and cages fixed in shallow backwaters and canals along the coast. The advantage of crab culture/fattening is that the water bodies not ideal for shrimp farming can be also utilized. Hence success in hatchery production of crab seeds may bring drastic development of this lucrative business.

Mussel Culture

Mussels are the most efficient food converters due to their direct dependence on primary producers .The green mussels *Perna viridis* and the brown mussel *P.indica* are distributed in rocky coastal areas along the east and west coast of India, where they form a traditional fishery. Mussels have domestic and foreign demand. Farming mussels in estuaries is less expensive and provides scope for effective utilisation of water resources. The CMFRI has developed technology for farming of mussels in open sea and protected bays. The technology is simple and cost effective and has been successfully extended to fishermen along Kerala and Karnataka coasts as well as to several Self Help Groups of fisherwomen (Pillai, 2000). Fisherwomen can easily take up mussel culture as a small scale venture in coastal areas as a group activity. The mussel farming being less labour- intensive with minimal inputs, day to day management can be done better by women than by men. The main problem in the adoption and proliferation of mussel culture in our coastal waters is the lack of appropriate water use policy and legislative protection against poaching.

Seaweed Collection and Culture

In India, sea weeds are harvested from the natural beds along the Tamil Nadu and Gujarat coasts since 1966. The estimation of seaweed resources indicates that there are about 2.6 lakh tonnes of standing crops all along the Indian coast. But, from among this only a negligible quantity is currently harvested. At present nearly 5000 women are depending on the seaweed industries for their livelihood. If the available resources are harvested to its optimum level it can provide employment to another 20,000 coastal fisherfolk in harvesting sector and an equal number in post-harvest activities. Since the domain of seaweed industry is mainly dominated by women, special efforts should be taken for its optimum exploitation and market expansion through diversified product development and their popularization.

The major seaweed species exploited from the natural beds are *Gelidiella acerosa, Gracilaria edulis, G. crassa, Sargassum Wightii, S,.myriocystum, S. ilicifolium, Turbinaria conoides, T. deccurens and T.ornata.* However seaweed resources in our coastal waters are inadequate to meet the growing demand for raw materials for our sea weed industries. Already technology is available for the culture of commercially important seaweeds in open waters. Cultivation of sea weed is carried out by two methods: vegetative propagation using fragments from mother plant and reproductive method by different kinds of spores such as carpospores, zoospores and tetra spores. The world production of brown sea weeds through aquaculture is 4.9 million tonnes and commercial scale mariculture of sea weeds is yet to be taken up in India. Both the open sea exploitation of seaweed resources and mari-culture of seaweeds should be encouraged as it provides maximum employment to women.

Edible Oyster Culture

The edible Indian oyster *Crassostrea madrasensis* forms a subsistence fishery in coastal areas. Though oysters have a limited local demand, they fetch a high price in the foreign

market. The CMFRI has developed a cost effective method for farming of edible oyster, called the rack and ren method, which is ideal for shallow estuaries, lagoons and backwaters of Kerala, Karnataka, Tamil Nadu and Andhra Pradesh (Pillai,2000). Oyster farming can be taken up as a viable small-scale venture by fisherwomen supported by adequate product development and market expansion.

Marine and Fresh Water Pearl Production

Marine and fresh water molluscs produce pearls. While bivalves are most important in pearl culture, the gastropod, abalone also yields valuable pearls. The technology for pearl production, from both fresh and marine habitats is available. The pearl oysters *Pintada fucata* and *P. margaretifera* are of great economic importance as they contribute significantly to the pearl production industry. Although indigenously developed technologies for marine and freshwater pearl culture are available only few commercial ventures have come up (Narasimham 2001). The country imports about Rs.100 crores worth of pearls/year. The world production of pearls is estimated at about 300 tonnes and freshwater pearls account for over 2/3rd mainly coming form China and Japan. Extension efforts supported with training programmes to women in marine and fresh water pearl culture may trigger off this industry.

Technology for Breeding and Seed Production of Pearl Spot *Etroplus Suratensis*

The pearl spot *Etroplus suratensis* is commonly found in the estuaries, backwaters, freshwater ponds and lakes. It can also be introduced in the semi-arid regions using ground saline water where there is great demand for seed. The fish can be easily poly cultured with other fishes like milk fish *Chanos chanos* and grey mullet *Mugil cephalus* and shrimp in brackish water ponds. A similar technology for the pond breeding of pearlspot by means of salinity manipulation was developed by CIBA. The methodology for seed production is easy and economics of operation is highly viable. (Mathew Abraham and Munawar Sultana,1995).The domestic demand for pearl spot is very high and witnessing a continuous increasing trend over the years. The multiplication of seed production of pearl spot and bringing out an acceleratory and multiplier effect in aquaculture sector is quite possible as pearl spot can grow easily in home stead and unutilized water bodies. Women can easily take up the breeding and seed production of this fish in small backyard or ponds in rural areas.

Fish Farming

Fish farming could be initiated to demonstrate practical feasibility and the range of benefits in terms of economic gains, labour efficiency, self-employment opportunities and multiple choice of vocations that aquaculture offer to fisherwomen. Aquaculture is an appropriate technology for women being compatible with their physical capacity and general aptitude. Small backyard ponds of even 0.01 ha can serve as a resource base to generate steady

income through out the year. The use of pond embankment for seasonal horticulture crops could provide a successful integration for optimum productivity per unit area. Experiments of the Institution Village Linkage Programme (IVLP) of CMFRI undertaken in Elamkunnapuzha village of Ernakulam District of Kerala amply proved this (Sathiadhas *et at.*, 2003 b). This removes the rigid compartmentalization and work structure for women and gives more multi-skilled type of job openings to fisherwomen. The backyard ponds could be of immense use for taking sizeable crops of fry, fingerling and even table size fish in succession, providing self-employment to fisherwomen.

Ornamental Fish Culture

Ornamental fishes are often called as "Living Jewels" due to their attractive looks and a resource for enhancing foreign exchange earnings. Globally, there has always been a upsurge of demand for ornamental fish. Reports say that there is an annual turn over of $ 700 million globally, attributed to aquarium fish marketing. The Marine Products Export Development Authority (MPEDA) has estimated that India can earn about US $ 5 billion as foreign exchange by export marketing of aquarium fish. Considering this, it is depressing that India, having immense natural resources suitable for fish breeding, could not rise to the occasion to cater the global demand and reap the benefits.

There are established technologies for breeding of ornamental fishes. These are well proven scientifically and are standardised. Production model has also been well defined. By virtue of extensive scientific studies and observations, it is now possible to breed most of the aquarium fish as a house hold activity, both at rural and urban levels. In fact, many community-based projects have been seriously examining the scope of production of ornamental fish as a secondary source of income for the poorer sections of society. Ornamental fish farming has great potential in India as this has got high demand in both domestic and export market. Moreover this can be practiced as a part time occupation by fisherwomen in their homesteads without much difficulty. It is an eco-friendly practice and fisherwomen in small groups can create the infrastructure and can make it into an economically efficient farming enterprise, which could be integrated with agriculture and animal husbandry.

Fishery Estates

Establishment of fishery estates in marine, brackish and fresh water segments is one of the best options available for the promotion of aquaculture and fisheries production in this country. Inspite of huge potential for the development of mariculture and aquaculture, lack of adequate legislative support in water use pattern, traditional fishing rights in certain regions and consequent poaching serves as stumbling blocks for the growth of aquaculture Industry in India. The little development achieved is also restricted with shrimp-oriented aquaculture although there are innumerable technologies available for diversification. Integration of site-specific and species-specific aquaculture development in different regions

by establishing fisheries estates with massive investment support from Govt., Banks and co-operatives may generate lot of employment to the weaker sections and ensure the increase in the much needed fish production. These estates will be coming up mainly in rural areas ensuring the involvement of women and economic growth of backward regions and thereby bringing rural prosperity. Mariculture estates in calm bays in our coastal regions, brackish water estates in our back waters and landward coastal region beyond CRZ and fresh water estates for innumerable sites should be developed with community participation. The Coastal Zone Development Authority (CZDA), Brackish Water Fish Farmers Development Agencies (BFFDA) and Fish Farms Development Agencies (FFDA) of concerned States should be entrusted this responsibility of planning, organising and developing these estates. In fresh water aquaculture, currently the production is mainly contributed by Indian Major Carps particularly Catla and Rohu catering the domestic demand but there is need to diversify and introduce export oriented fish species in culture systems for the growth of the industry. Fishery estates can take care of such aspects by concentrating on demand oriented production and pave the way for the integrated development of the entire fishery sector. Some of the fishery estates may even turn into spots of important eco-tourism centres which will provide livelihood options to many people

Small-scale Industry for Fish and Prawn Feed Production

Availability of low cost nutritious feed has been a constraint in the adoption and development of diversified aquaculture practices. The most important input required for the growing aquaculture sector is indigenously made, efficient low cost feeds. Currently substantial quantity of feed is either imported or manufactured and supplied by big industrial houses. Cost reduction in preparation and availability of low cost feed is very essential to maximise the profitability of aquaculture practices. Hence, locally available resources should be utilized for preparing low cost high efficient feeds. The technology for feed production using locally available ingredients is found to be highly appropriate for women as an income generating activity.

Post-harvest Activities and Value Addition

There is ample scope to make quantitative and qualitative changes in the employment scenario of post-harvest sector of fisheries. Hygienic handling from the point of catching/ production to the ultimate consumer generates lot of employment. Not only fresh fish trade but also processing, preservation, storage and distribution sectors accommodate more women than men. In the processing segment almost 90% of the peeling works are undertaken exclusively by women.

Enhancing the Quality of the fish and fishery products in the domestic marketing system and producing value added products focused on targeted importing countries can result in manifold increase in employment opportunities. Promotion of diversified value added products not only accelerate our foreign exchange earnings in exports but also provide a

multiplier effect on employment front especially for weaker sections and women folk. An additional export of almost 1 lakh tonnes of value added products in our marine products could easily corner about Rs. 1,500 crores of foreign exchange earnings and generate regular employment opportunities of about 35,000 fisherfolk (Sathiadhas and Femeena 2002). Efforts taken by government and non-governmental agencies to organise fisher women into self help groups and involving them in the preparation of value added products and marketing has brought out encouraging results. Hence appropriate training programmes in the preparation of location- oriented, resource-specific value added products should be imparted to women folk and link them with credit and marketing facilities

EMPOWERMENT OF WOMEN THROUGH SELF HELP GROUPS (SHG's)

The concept of SHG's – comparatively recent introduction in the present day set up-has helped many people especially in the rural India. The National Bank for Agriculture and Rural Development (NABARD) encouraged this concept and offered all institutional support for the development of the rural community. Here the responsibility was entrusted to the women. The details regarding the membership in any SHG's by the respondents were collected and presented in Table 9.

Table 9. Membership of fisherwomen in Self Help Groups- AP, Karnataka, Kerala and Tamil Nadu

Name of State	Members	Not members	Total
Andhra Pradesh	419 (23.3)	1381(76.7)	1800(100.0)
Karnataka	223(22.1)	785(77.9)	1008(100.0)
Kerala	602(48.0)	653(52.0)	1255(100.0)
Tamil Nadu	1096(65.2)	585(34.8)	1681(100.0)
Total	2340(40.70)	3404(59.3)	5744(100.0)

Source: Kasim *et al.*, (2003) **Note:** *Figures in parenthesis are percentages*

It is observed from Table 9 that about 59.3 percent of the women are not members of women SHG's and the remaining 40.7 per cent of the women only are members of a few women SHG's operating in their localities. In Tamil Nadu about 65% of the women only avail the membership in self help groups. More than 75% of the women could not avail the membership in the State of Andhra Pradesh and Karnataka. The membership of women in self help groups in fishing villages of Kerala is 48%. It was found that women in SHG,s are getting not only more involvement in income generating activities but also receiving comparatively better remuneration.

POLICY SUGGESTIONS

Involvement of women in capture fisheries especially near shore marine fishing, back water and riverine fisheries should be encouraged by extending intensive training on recent

technologies and providing fishing equipments through easy credit facilities. Further location-specific and need based training programmes for fisherwomen should be organised to enhance the awareness and technical know-how enabling them to start self-generating gainful employment ventures in aquaculture and post harvest sector of fisheries. Involvement of women in all types of aquaculture practices should be encouraged. There is enormous scope to adopt and expand ornamental fish culture to earn a very high income both in rural and urban centres. India is bestowed with vast indigenous stock of germplasm and women could significantly contribute to this sector if trained and oriented in the right direction.

Similarly, in view of the possibilities of income and employment generation in the rural areas, pearl culture could be suggested as an alternative and lucrative micro-venture, especially to women, both in marine and freshwater segments. The world production of pearl is estimated at about 300 tonnes and 2/3rd of freshwater pearl trade is still dominated by China and Japan. India imports pearls to the tune of Rs.100 crores in a year (Narasimham 2001). Although indigenously developed technologies for marine and freshwater pearl culture are available, few commercial ventures have come up. Freshwater pearl culture is fast picking up and there are moves to integrate it with the carp culture to generate additional revenue to the farmer. Women could take up pearl culture as a productive income-earning venture on account of the vast unutilised potential.

Yet another opportunity in aquaculture is the extensive adoption of Mussel culture by Self Help Groups (SHGs) of women. CMFRI has developed a technology for the farming of mussels in the open sea and protected bays. The technology is simple and cost effective and has been widely adopted by the fisherfolk of Kerala and Karnataka (Pillai, 2000). Several women SHGs in the Kasaragod district of Northern Kerala have successfully tailored the venture and proved profitable.

House-based ventures are more preferred by women and found ideal to their present social fabric. Aqua-feed making using the indigenous resources as a cottage industry may be developed to suit the needs of the aquaculture industry. Women in various site of Kerala and Tamil Nadu has come up with successful enterprises. Apart from this, development of backyard hatcheries to cope with the local demand patterns of quality seeds of fish / shrimps could be taken up. Appropriate training programmes, including the possible linkages of necessary credit facilities in liaison with scientific institutes and formal financial institutions respectively should be imparted to the primary stakeholders. It is better to promote "men and women partnership firms" instead of exclusively women-oriented enterprises. It is seen that husband-wife enterprises with one or two helpers in fish processing / marketing and other fishery related activity yields better prospects.

More emphasis should be given for the involvement of women in the preparation of value added products. Promotion of diversified value added products not only accelerate earnings in exports, but also provide a multiplier effect on employment front especially for weaker sections and women folk. An additional export of almost 1-lakh tonnes of value added products in our marine products could easily corner about Rs.1500 crores of export earnings and generate regular employment opportunity to about 35,000 fisherfolk. Efforts

taken by government and non-governmental agencies to organise fisherwomen into self help groups and involving them in the preparation of value added products and marketing has brought out encouraging results.

CONCLUSION

Fisheries is a key sector of Indian economy witnessing progressive and drastic changes over the years both in production and marketing. The ever increasing domestic and export demand for fish and fishery products not only enhanced our foreign exchange earnings but also triggered off the employment opportunities in primary, secondary and tertiary sectors. Aquaculture is emerging as a multi-million industry having enormous scope for further expansion. Women are involved more in aquaculture production than in capture fisheries. Increasing entrepreneurial activities in post-harvest segment of fisheries also skewed towards women in providing more and more employment opportunities. Women is an economic partner to man besides biological and social roles performed. Fisherwomen due to the emergence of nuclear families with increased cost of living and needs of the family are taking up small business and trade to supplement their income and standard of living. But when it comes to entrepreneurship, still man seems to dominate the entrepreneurial world. Entrepreneurship is not simply a masculine job. Woman too is equally endowed with the required qualities and managerial abilities that matter in successful entrepreneurship. The statuesque is gradually changing and time has come when one starts thinking, exploring and working towards the woman entrepreneurship.

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